



Inequalities in Adolescent Physical Activity in Catalonia: The Influence of Socioeconomic Status, Immigration, and Gender

Eric Roig-Hierro¹ , Laia Garcia-Dalmases¹ , Xènia Ríos-Sisó^{2*} , Núria Ros¹
& Joana Niubò¹

¹ Department of Applied Didactics, University of Barcelona. Barcelona (Spain).

² Department of Didactics of Musical, Visual, and Physical Expression, Autonomous University of Barcelona. Barcelona (Spain).



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Abstract

Physical activity (PA) during adolescence is essential to physical, mental, and social development. However, not all teens have equal access to these benefits. Cultural and socioeconomic status (SES), immigrant background, and gender are all factors that condition how often adolescents engage in PA. In Catalonia, these inequalities are particularly relevant given the growing diversity and the ongoing socioeconomic inequality in the region. Using data from the PISA 2022 study of 1,524 15-year-old Catalan adolescents, we analyzed the impact of inequality factors on weekly participation in PA. The results show significant differences in weekly AF frequency according to adolescents' NSEC ($p < .001$). While high NSEC is predominantly associated with intermediate frequencies (2–4 times/week), low NSEC is overrepresented in both the low-practice category (0–1 time/week) and the very high-practice category (≥ 5 times/week). Regarding immigrant background, native adolescents reported participating more often in PA than first-generation immigrants, particularly in higher frequencies (≥ 3 times/week). As for gender, boys clearly outnumber girls regarding frequency of participation in PA, with 58.35% engaging in PA 5 or more times per week compared to 33.37% of girls. These inequalities bring to light the social, economic, and cultural barriers that limit vulnerable groups' access to PA. We underscore the need to create policies that promote women's and girls' participation in PA, specific subsidies, and cultural integration programs, to foster equitable access and ensure the benefits of PA on adolescents' well-being.

Keywords: adolescents, gender, immigration, inequality, physical activity, socioeconomic status

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Institut Nacional d'Educació
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*Corresponding author:

Xènia Ríos-Sisó
xenia.rios@uab.cat

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Aerial view of a paragliding
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Introduction

Physical activity (PA) and sport are essential for the healthy development of individuals, as they help prevent disease and improve mental health, quality of life, and social skills, thereby enhancing overall well-being (Dimitri et al., 2020; Poitras et al., 2016). With this in mind, institutions and governments have promoted strategies to encourage PA as a tool to foster well-being and quality of life (WHO, 2020). However, these benefits may be curtailed during adolescence due to various invisible barriers that must be eliminated. Various studies have discussed inequalities in participation in PA among adolescents due to social and cultural factors (Alliott et al., 2022).

The current literature describes three fundamental factors of inequality that condition frequency of participation in PA: cultural and socioeconomic status (SES), immigrant background, and gender, (Ferry & Lund, 2016; Kaya et al., 2021; Tandon et al., 2021). As far as socioeconomic status is concerned, youth with higher SES engage in PA more often, which can be explained by their greater economic capacity to access sports activities and suitable facilities (Eime et al., 2017; Tandon et al., 2021). In terms of immigrant background, barriers to social and cultural integration often hinder access to organized sports and PA among adolescents from immigrant families. Meanwhile, a lack of sports role models or inclusive cultural spaces can also aggravate this exclusion (Kaya et al., 2021). In that sense, adolescents from immigrant backgrounds may experience a lack of cultural and social support (Alliott et al., 2022; Eime et al., 2017).

Lastly, gender is another decisive factor, as girls tend to participate less in PA (Ferry & Lund, 2016; Gutiérrez & García-López, 2012; Muñoz-Arroyave et al., 2021). According to the literature, this difference in participation level may be due to social stereotypes, expectations, or perceptions of ability, which ultimately influence adolescent girls' decisions to participate, or not, in physical activities (Moreno-Vitoria et al., 2024; Vidal-Conti, 2016). Internationally, there is growing concern around gender-related inequality, as seen in instruments like the International Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) and the revised UNESCO International Charter of Physical Education, Physical Activity, and Sport (Flores et al., 2022), which promote gender equality in sports.

Socioeconomic and cultural inequalities cause a social divide that is also observed in adolescents' participation in PA, with the consequent negative impact on their physical and social well-being. While policies targeted at fixing this situation are established by designating funds, publishing formal guidelines, and establishing sports agendas, the individuals responsible for formulating this response rarely come into direct contact with the end users. This aggravates the divide between the creation of inclusive policies and their actual execution, thus reducing the impact and actual access for these groups (Dashper et al., 2019). Some countries have implemented strategies to guarantee equitable access to sports activities, such as creating specific subsidies and cultural support programs for less affluent groups (Hämäläinen et al., 2016), a type of initiative that is essential to promoting PA in adolescents from different backgrounds and socioeconomic situations, thereby contributing to a more inclusive society.

The most recent studies conducted in Catalonia identified the following three main factors of inequality regarding participation in extracurricular sports: background of the children and adolescents—up to a 25% difference between native-born and immigrant-origin children (Alegre & Morató, 2025), socioeconomic status of the families—up to 24% difference between more affluent and more vulnerable families (Mencía & Samper, 2023), and gender (Observatori Català de l'Esport, 2023). Nevertheless, the available data for Catalonia are limited, particularly regarding children and adolescents. Except for the survey on extracurricular participation in Catalonia (Mencía & Samper, 2023), no specific studies have analyzed the participation in and frequency of PA among children and adolescents, nor the impact of factors such as gender, immigrant background, and socioeconomic status on said participation. It is also crucial to take an in-depth look at how these factors interact and amplify inequality in the frequency of adolescents' engagement in PA.

Therefore, the objective of this research was to analyze the frequency of Catalan adolescents' participation in PA based on SES, immigrant background, and gender. The study aimed to gain a better understanding of how different factors of inequality influence participation in PA. The resulting information could be key to advancing the creation of policies and interventions targeted at promoting equitable PA participation in adolescents.

Methodology

Participants

The study was conducted using data from the PISA 2022 database (OECD, 2023), analyzing a sample of 1,524 high school students (15 years old, 10th grade) in Catalonia. We chose this age group as it was the sample used in the PISA study, which measures the skills and knowledge of 15-year-old students around the world. PISA uses a stratified sample design, which randomly selects schools that represent a series of students from every region or country.

This study was conducted in accordance with the European Code of Conduct for Research Integrity (ALLEA, 2023) to uphold ethical research practices, and complied with the PISA ethical guidelines, which guarantee the privacy of the participants and institutional confidentiality. In Spain, participation in the PISA program is regulated by Organic Law 2/2006 (LOE) and its subsequent modifications, including the laws LOMCE the laws LOMCE and LOMLOE (by their Spanish acronyms), which regulate participation in educational assessments by schools and students. Data protection standards are also guaranteed by the Spanish government.

Materials and Instruments

We collected data from the PISA 2022 database, an international standardized program that assesses 15-year-olds' reading, mathematics, and science abilities. The questionnaire included sections that collected information about socioeconomic status, family, lifestyle habits, and PA.

The independent variable was the frequency of weekly PA, as reported in PISA through a questionnaire that asked participants how many days per week they engaged in physical exercise outside school hours. We established six categories ranging from no days of PA practice to 1, 2, 3, 4 and 5 or more times per week.

To facilitate the analysis and interpretation of the results, we placed the male and female participants who engaged in PA 5 or more times per week into a single group, as this threshold allowed us to identify adolescents who regularly and frequently participated in PA.

The independent study variables were socioeconomic status, immigrant background, and gender. In terms of cultural and socioeconomic status, we used the scale that PISA builds for each student based on the employment information of their parents, the education level, and home resources. Participants were classified into three groups (low, medium, and high) using the 25%, 50% and 75% percentiles. In terms of immigrant

background, the OECD classifies this according to three groups:

1. *Native*: adolescents whose parents were born in the same country.
2. *Second-generation*: adolescents born in the country of assessment but with at least one parent born in another country.
3. *First-generation*: adolescents born outside the country of assessment or whose parents were born abroad.

Lastly, in terms of gender, the OECD limits categorization to the dichotomous variable of male or female.

Data Analysis

We calculated the descriptive statistics for each independent and dependent variable. We then used the chi-square test to assess the relationship between each independent variable (cultural and socioeconomic status, immigrant background, and gender) and the frequency of weekly exercise. This allowed us to identify whether the differences observed between groups were statistically significant. To identify where there were significant differences, we conducted post hoc tests via the analysis of adjusted standardized residuals. This approach allowed us to determine which combinations of gender, socioeconomic status, and immigrant background presented more prominent inequalities in participation in PA. To supplement the analysis, we included multinomial logistic regression models to explore the interaction between gender, socioeconomic status, and immigrant background regarding participation in PA. This intersectional approach allowed us to identify specific patterns of inequality resulting from a combination of these factors.

We used the program SPSS version 29.0 to conduct the statistical analyses. The significance level was set at $p < .05$. Significant associations were interpreted as indicators of unequal participation in PA according to the three analyzed factors.

Results

The study included 1,524 10th-grade adolescents with an average age of 15 years according to the OECD (758 girls and 766 boys) who participated in the PISA 2022 study. That said, the sample size varied according to the variables analyzed: 1,132 adolescents in the socioeconomic status-based analysis and 1,443 in the immigrant background-based analysis. This variation is due to the use of personalized questionnaires by PISA and because not all participants responded to all questions. Despite this reduction the analyses guarantee a representative sample in all the areas analyzed.

Table 1*Social, cultural, and economic status index percentiles used in this research*

Cultural and socioeconomic status percentile	Cut-off percent	Cut-off value
Low	25	-.567200
Medium	50	.182900
High	75	.792800

Table 2*Frequency of weekly sport or exercise before or after school according to socioeconomic status*

Socioeconomic status	Does not engage in exercise or sport	1 time per week	2 times per week	3 times per week	4 times per week	5 times or more per week	TOTAL
Low	66 (17.74%)	18 (4.83%)	41 (11.02%)	26 (6.98%)	38 (10.21%)	183 (49.19%)	372
Medium	60 (15.78%)	12 (3.15%)	48 (12.63%)	47 (12.36%)	47 (12.36%)	166 (43.68%)	380
High	40 (10.52%)	10 (2.63%)	49 (12.89%)	58 (15.26%)	56 (14.73%)	167 (43.94%)	380
TOTAL	166 (14.66%)	40 (3.53%)	138 (12.19%)	131 (11.57%)	141 (12.45%)	516 (45.58%)	1132

Socioeconomic and Cultural Status and Frequency of Engagement in Exercise or Sport

The socioeconomic status variable was categorized into three groups (low, medium, and high) based on the social, cultural, and economic status index percentiles (see Table 1). The results showed a differing distribution in the frequency of participation in PA based on socioeconomic status (see Table 2).

Regarding high-frequency exercise, 73.93% of adolescents with high socioeconomic status engaged in physical activity 3 or more times per week, representing the group with the highest participation in this range. In contrast, at lower frequencies (never or once per week), a higher percentage of adolescents with low socioeconomic status was observed (22.57%) compared to the others (18.93% medium and 13.15% high). Additionally, at 5 or more times per week, the group with the highest participation was the low socioeconomic status group (49.19%), nearly 6% higher than the medium- and high-status groups. In that sense, the chi-square test revealed significant associations between the cultural and socioeconomic status variable and the frequency of weekly participation in sports or exercise ($\chi^2(20) = 50.720$; $p < .001$). Standardized residuals revealed that groups with a lower percentile of socioeconomic status were concentrated in the 0 and 1 times per week exercise categories (residuals of 2.0 and 1.7, respectively), as well as in the 5 or more times per week category (residual of 1.7). In contrast, groups with a higher percentile were concentrated in the 3 and 4 times per week categories (residuals of 2.8 and 1.7).

Immigrant Background and Frequency of Exercise or Sport

With regard to familial immigrant background, the adolescents were grouped into three categories according to the OECD classification: natives, second-generation, and first-generation. A higher proportion of native participants reported exercising regularly, with 14.10% engaging in PA 4 times per week, compared to 9.75% of second-generation and 8% of first-generation adolescents. The proportion of adolescents who did not participate in any type of exercise was notably higher among first-generation participants (23.20%) compared to the native adolescents (11.41%). At a frequency of 3 times per week or more, native adolescents were the most active in sports or exercise, while at frequencies between 0 and 2 days per week, first-generation adolescents were the most represented. Table 3 shows the detailed results.

When the distribution of PA frequency was analyzed by immigrant background based on the chi-square test, a significant association became apparent ($\chi^2(20) = 42.087$, $p = .003$). The adjusted standardized residuals revealed that first-generation immigrant background adolescents had a higher presence in the 0 and 1 times per week categories (residuals of 3.5 and 1.8, respectively), while native adolescents presented significant positive associations in the 3 to 5 times per week categories (residuals of 2.2, 2.4, and 1.7).

Table 3
Weekly frequency of participation in exercise or sport according to immigrant background

Immigrant background	Does not engage in exercise or sport	1 time per week	2 times per week	3 times per week	4 times per week	5 times or more per week
Native	127 (11.41%)	31 (2.78%)	140 (12.57%)	156 (14.01%)	157 (14.10%)	502 (45%)
Second-generation	33 (16.09%)	12 (5.85%)	24 (11.7%)	17 (8.29%)	20 (9.75%)	99 (48%)
First-generation	29 (23.2%)	8 (6.4%)	15 (12%)	14 (11.2%)	10 (8%)	49 (39%)
TOTAL	189 (13.09%)	51 (3.53%)	179 (12.4%)	187 (12.95%)	187 (12.95%)	650 (45%)

Table 4
Weekly frequency of exercise or sport by gender

Gender	Does not engage in exercise or sport	1 time per week	2 times per week	3 times per week	4 times per week	5 times or more per week
Female	133 (17.54%)	39 (5.14%)	118 (15.56%)	110 (14.51%)	105 (13.85%)	253 (33.37%)
Male	65 (8.48%)	14 (1.82%)	68 (8.8%)	80 (10.44%)	92 (12.01%)	447 (58.35%)
TOTAL	198 (12.99%)	53 (3.47%)	186 (12.2%)	190 (12.46%)	197 (12.92%)	700 (45.93%)

Gender and Frequency of Exercise or Sport

Male adolescents presented more frequent participation in physical exercise compared to the female population. Some 58.35% of the boys reported engaging in some form of exercise 5 times or more per week, while only 33.37% of the girls reported this level of frequency. By contrast, the girls presented a higher proportion of participants who did not participate in any exercise or sport (17.54% for girls compared to 8.48% for boys). For the 5 times per week or more frequency, we observed higher participation among boys while girls' participation in exercise or sport was higher in the frequency of up to 4 days per week.

The chi-square test revealed significant associations between the gender variable and the frequency of weekly participation in sport or exercise ($\chi^2(10) = 126.148$; $p < .001$). The adjusted standardized residuals showed that girls had a higher presence in the 0, 1, and 2 days per week categories (residuals of 5.3, 3.5, and 4.0, respectively) while boys had a higher presence in the 5 days or more per week category (residuals of 4.0 and 7.5).

Our multinomial logistic regression analysis of the interaction between the gender, cultural and socioeconomic status, and immigrant background variables identified significant effects, particularly among the lower participation frequencies. The results show that, for the 0 days of PA per week category, the interactions between female gender and socioeconomic status percentiles 1 and 2 were significant ($p < .001$), indicating that girls with a lower socioeconomic

status were less likely to participate in sports or exercise. By contrast, this interaction was not significant for socioeconomic status percentile 3 ($p = .393$), suggesting that the highest socioeconomic status does not have the same impact on girls' participation in exercise activities.

In the case of engaging in PA 1 day per week, we did not observe any significant interaction between gender and socioeconomic status. Nevertheless, in the 2 days of PA per week category, this was significant for socioeconomic status percentiles 1 and 2 ($p < .001$), but not significant for percentile 3 ($p = .717$). In terms of immigrant background, the results did not present significant effects in the interaction with other variables.

Discussion

The study results show that socioeconomic status, immigrant background, and gender are factors that contribute to unequal participation in PA in adolescents in Catalonia. Adolescents with higher socioeconomic status and those considered native exhibit higher AF frequency in the range of 2 to 4 times per week. According to recent studies in Catalonia, this is the weekly practice range most associated with positive effects on academic performance (Roig-Hierro et al., 2025). Unexpectedly, adolescents with lower socioeconomic status show higher participation in the 5 or more times per week range. Although this may seem like a positive outcome, such very high frequency has also been

linked to potential distracting effects and negative impacts on academic performance (Roig-Hierro et al., 2025). In terms of gender, girls presented lower participation in PA than boys. In addition, the results point to a significant intersection between socioeconomic status and gender that amplifies the observed inequalities. Specifically, girls from low socioeconomic status families presented notably lower participation in PA compared to both boys with the same socioeconomic status and adolescents with a higher socioeconomic status. These results allow us to highlight these three factors—socioeconomic status, immigrant background, and gender—as key elements of inequality in adolescents' weekly participation in PA.

Previous studies have pointed to socioeconomic status and immigrant background as key factors that condition access to PA (Kaya et al., 2021; Tandon et al., 2021; Alegre & Morató, 2025; Mencía & Samper, 2023). In that regard, the study on extracurricular participation in Catalonia promoted by the organization *Educació 360* emphasized that inequality in extracurricular sport activities not only manifests in participation rate, but also in the type of activity and intensity of practice (weekly hours) (Mencía & Samper, 2023). This evidence highlights the importance of broadening our analysis beyond mere participation in PA to examine its frequency and type as key aspects to gaining a better understanding of inequality in this setting. The results of this study align with previous literature, which indicates that adolescents with higher socioeconomic status have greater access to sports activities and quality facilities, due to their families' purchasing power (Ramos et al., 2016). However, further interpretation is needed regarding the finding that adolescents from lower socioeconomic backgrounds concentrate a higher proportion of physical activity practice (≥ 5 times/week). While this may reflect high levels of physical engagement, it could also mask underlying inequalities, as these high frequencies have been associated with factors such as low educational attainment, low self-esteem, or eating behavior disorders (Caponetto et al., 2021). This paradox provides a relevant avenue for further analysis to better understand the links between intense physical activity practice and social vulnerability.

These inequalities have a long history, with data from the Observatori Català de l'Esport (2014) showing that, in terms of socioeconomic status, some 17.9% of the upper-middle/upper class plays one sport and 46.2% plays multiple sports, while only 10.3% does not play any sport. On the other hand, among unqualified blue-collar workers, 18.4% practice one sport, 14.3% multiple sports, and 32.7% no sports at all.

Beyond socioeconomic status, students from an immigrant background, particularly first-generation adolescents, participate in PA less frequently than their native counterparts.

This result is in keeping with studies that have identified issues with social and cultural integration as another barrier in addition to economic limitations (Kaya et al., 2021). In Catalonia, where diversity has grown significantly due to immigration (Ruiz-Trasserra et al., 2017), guaranteeing inclusion in sport and PA for all groups is fundamental. This evidence highlights the need for specific support, such as social guidance measures and inclusion strategies to prevent youth from developing sedentary habits and suffering from the subsequent negative repercussions on their long-term health and well-being (van Sluijs et al., 2021).

This study's results also confirm the existence of gender inequality in PA participation, revealing that girls tend to participate in PA less often than boys. These gender differences in PA have been discussed in multiple studies (Ferry & Lund, 2016; Gutiérrez & García-López, 2012; Muñoz-Arroyave et al., 2021) that attribute this inequality to gender stereotypes, concerns about performance and social acceptance, and girls' perceptions of sport as a non-inclusive space (Ramos et al., 2016; Vidal-Conti, 2016).

As highlighted in the present study, it is possible that gender inequality also intersects with other factors of inequality, such as socioeconomic status. This interaction suggests that the combination of social disadvantages may have a cumulative effect that additionally limits access to PA. This underscores the need to create inclusive policies that jointly address such inequalities and respond to the specific needs of the most vulnerable population groups (Hämäläinen et al., 2016).

To promote greater equity in participation in PA, inclusive policies are essential and must go beyond accounting for the supply and consider more broadly the plethora of barriers facing these groups (Dashper et al., 2019). Facilitating factors could include subsidies to lower registration costs for sports activities targeted at less affluent families, and specific programs aimed at immigrant youth that foster a safe and inclusive environment for engaging in PA (Ajuntament de Barcelona, 2023). Likewise, a cultural shift must be encouraged in school sports by adopting strategies to break down gender stereotypes and offering a diverse range of activities that will draw the attention of both boys and girls. Adopting these measures could contribute to reducing inequalities in PA and allow all adolescents to access the physical and psychological benefits of sports activity.

These facilitating factors must be implemented within a broader commitment from the public administration. The study results reveal a structural problem that cannot be tackled solely with isolated measures or one-off interventions. A global strategy is needed that incorporates these elements within an educational policy for extracurricular sports

featuring concrete mechanisms to guarantee equitable access to PA, specifically for vulnerable groups.

As reported by Alegre & Morató (2025), despite the existence of extracurricular programs targeted at these specific groups in multiple towns, their implementation is heterogeneous and largely depends on the availability of local resources. This demonstrates the need to integrate these initiatives within a stable and coordinated political framework that considers PA to be a key element of the educational agenda. The objective must involve guaranteeing a quality, accessible, and diverse offering of sports activities, thereby fostering truly equitable access to the physical, social, and psychological benefits of PA and sports.

Multiple initiatives can serve as an example for future policies. In Barcelona, the subsidy program for extracurricular sports activities for less affluent families is committed to improving access to PA (Ajuntament de Barcelona, 2023). Cultural projects like the *Criquet Jove a BCN* [Youth cricket in Barcelona] promote the integration of immigrant youth within a sporting context that caters to their cultural interests, creating safe spaces to participate in PA and contributing to social cohesion (CEAi & FEEB, 2024). Other programs such as the *Escola Esport Ciutat* [School Sport City] (Ajuntament de Barcelona, 2024) promote unconventional sports in schools, offer opportunities to broaden the variety of activities available to students, facilitate the discovery of new sports, and foster active lifestyles from a young age and connection during after-school hours. One additional option could be to incorporate specific mechanisms to identify and include vulnerable groups using individual criteria in addition to regional criteria, as part of currently active programs in Catalonia like *Fitjove* (Generalitat de Catalunya, 2023).

Limitations and Future Directions

This study has various limitations that must be taken into account when interpreting the results. First, because the data was sourced from the PISA report, our sample only includes 15-year-old adolescents, which could hinder extrapolation to other adolescent age groups. Future research is needed of a longitudinal nature or focused on other age groups to analyze the evolution of participation in PA over time. Additionally, this study should be supplemented by a more qualitative analytical perspective that can offer an in-depth understanding of the perceived motivations and barriers among adolescents in vulnerable situations. Second, this study focused on a specific geographical context, namely Catalonia, and a limited set of variables, which could limit generalization of the results

to other regions or sociocultural settings. Broadening the research to other contexts and variables could offer a more complete vision of inequalities in PA.

Additionally, the analysis did not delve into the type of PA performed, a key aspect for better understanding the observed differences. The influence of factors such as financial resources or cultural dynamics also deserves more detailed investigation, particularly via qualitative methodologies. Lastly, the frequency of PA was measured using a single question in the PISA questionnaire, which could have introduced self-perception bias. We recommend that future research use validated instruments like the PAQ-C (Bello et al., 2020) to obtain more precise and reliable measures.

As a call to action, we propose that public institutions bolster implementation of inclusive policies that guarantee equitable access to PA for all adolescents with a specific focus on more vulnerable populations. In addition to these measures, developing a comprehensive education policy based on the *Educació 360* model could be key to promoting participation in extracurricular sports activities among at-risk children and youth. This requires a structural approach that involves modifying visibility of and access to PA opportunities as educational spaces for the fundamental development of adolescents. This involves making a firm, systematic, and sustainable commitment to universal access to and participation in PA. To achieve this objective, solid inter-institutional support will be required, as well as coordinated participation from the educational and community ecosystem around the adolescent population. Cross-sector policies must be designed in coordination with all the implicated departments (sports, education, youth, social and feminist rights) and coordinated actions must be taken by local administrations, educational centers, sports organizations, and families to work towards greater equity in participation in PA and the promotion of healthy and active lifestyles among Catalan youth.

Conclusions

Catalonia presents significant inequalities in adolescents' participation in PA according to socioeconomic status, immigrant background, and gender. Adolescents from less affluent families and an immigrant background, particularly first-generation teens, participate in PA less frequently, and girls in general engage in PA less often than boys, thereby perpetuating gender inequality. These results highlight the need for specific interventions to comprehensively tackle these structural barriers in order to promote equitable and inclusive participation in PA by these population groups.

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